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| 10/781,718 | 02/20/2004 | Jun Fujikami | 040256-0131 | 4177 |

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| EXAMINER | |
|---|---|
| PATEL, ISHWARBHAI B | |

| ART UNIT | PAPER NUMBER |
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| 2841 | |

DATE MAILED: 02/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/781,718 | FUJIKAMI, JUN | |
| | Examiner | Art Unit | |
| | Ishwar (I. B.) Patel | 2841 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *20 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/3/04, 1/6/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Priority*

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been received and placed of record in the file.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vulis (US Patent No. 4,184,042) in view of admitted prior art of Furukawa (Patent Abstract Publication No. 03255981) and Otto (US Patent No. 6,762,673).

**Regarding claim 1**, Vulis in figure 1, disclose a superconducting cable comprising a superconducting layer (4, 7), but does not disclose the superconducting layer has a portion whose critical current value is differentiated from the critical current value of the other portion. However, Vulis recites a need of providing a current limiting devices, which may be in the form of insert in the cable or a cavity to avoid damage to the cable, (column 1, line 5-50).

Furukawa discloses a low current area (1c) having critical current lower than other parts.

Otto, in figure 1A-1C, discloses various embodiment of the current limiting composites and further recites that the composites can be interposed / incorporated in the cable, (column 3, line 7-17 and column 4, line 6-21).

A person of ordinary skill in the art at the time of applicant's invention would have been motivated to incorporate such lower critical current structure in the superconductor layer (4, 7) of Vulis to protect the superconductor in case of sudden high current surge.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the superconductor layer (either 4 or 7 or both) with structure having a portion of lower critical current capacity within the layer, as taught by Furukawa and Otto, in order to protect the superconductor in case of sudden high current surge.

**Regarding claim 2**, the modified cable of Vulis further discloses the superconducting layer has a current limiting portion whose critical current value is smaller than that of the other portion, as applied to claim 1 above.

**Regarding claim 3**, the modified cable of Vulis further discloses the superconducting layer is at least one of a superconducting conductor layer (4) and a shielding layer (7) provided at the outer periphery of the superconducting conductor layer, as applied to claim 1 above.

**Regarding claim 4**, the modified cable of Vulis further discloses the superconducting layer is at least one of a superconducting conductor layer (4) and a shielding layer (7) provided at the outer periphery of the superconducting conductor layer, as applied to claim 2 above.

4. Claims 5-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the modified cable of Vulis, as applied to claims 1-4 above, and further in view of Dixon (US Patent No. 6,034,324) and Herrmann (US Patent No. 5,859,386) and Nassi (US Patent No. 6,743,984).

**Regarding claim 5**, the modified cable of Vulis discloses superconducting cable line comprising: a superconducting cable set forth in claim 1 (the modified cable of Vulis, as applied to claim 1 above) having a plurality of cable cores each including a superconducting layer (figure 6); but does not disclose a splitter which houses separated portions of the plurality of cable cores such that the separated cable cores are sufficiently distanced from each other, wherein the portions whose critical current values are differentiated from those of the normal portion (i.e., the other portion of the cable cores) are housed in the splitter.

Nassi, in figure 4, discloses a splitter housing three phase superconducting cable cores separated sufficiently distanced from each other, with cold area in a casing (111) in which coolant fluid is maintained a low temperature (column 8, line 54-62).

Dixon, in figure 1-3, discloses a modular high temperature superconducting lead for carrying large currents from a room temperature power source to a superconducting

device operating at cryogenic temperatures and further recites that internal part can be replaced if damaged.

Herrmann, in figure 1, discloses transmission line with metallic joint (2) metal tube (5) and further recites a one way valve to evacuate nitrogen gas resulting from evaporation of the liquid nitrogen.

It would have been obvious to a person of ordinary skill in the art to provide the modified superconducting line of Vulis in a splitter at connection where superconducting line is connected with non-superconducting line. Further, as recited by Dixon it would be advisable to arrange the repairable / replaceable part in the splitter box to be able to repair / replace in case of damage.

Therefore, it would have been obvious to a person ordinary skill in the art at the time of applicant's invention to have the modified cable of Vulis arranged in a splitter with critical current differentiated portion housed in the splitter from the teachings of Nassi, Dixon and Herrmann, in order to facilitate repair / replace the damaged components.

**Regarding claim 6**, the modified cable of Vulis discloses superconducting cable line comprising: a superconducting cable set forth in claim 2 (the modified cable of Vulis, as applied to claim 2 above) having a plurality of cable cores each including a superconducting layer (figure 6); but does not disclose a splitter which houses separated portions of the plurality of cable cores such that the separated cable cores are sufficiently distanced from each other, wherein the portions whose critical current

values are differentiated from those of the normal portion (i.e., the other portion of the cable cores) are housed in the splitter.

Nassi, in figure 4, discloses a splitter housing three phase superconducting cable cores separated sufficiently distanced from each other, with cold area in a casing (111) in which coolant fluid is maintained a low temperature (column 8, line 54-62).

Dixon, in figure 1-3, discloses a modular high temperature superconducting lead for carrying large currents from a room temperature power source to a superconducting device operating at cryogenic temperatures and further recites that internal part can be replaced if damaged.

Herrmann, in figure 1, discloses transmission line with metallic joint (2) metal tube (5) and further recites a one way valve to evacuate nitrogen gas resulting from evaporation of the liquid nitrogen.

It would have been obvious to a person of ordinary skill in the art to provide the modified superconducting line of Vulis in a splitter at connection where superconducting line is connected with non-superconducting line. Further, as recited by Dixon it would be advisable to arrange the repairable / replaceable part in the splitter box to be able to repair / replace in case of damage.

Therefore, it would have been obvious to a person ordinary skill in the art at the time of applicant's invention to have the modified cable of Vulis arranged in a splitter with critical current differentiated portion housed in the splitter from the teachings of Nassi, Dixon and Herrmann, in order to facilitate repair / replace the damaged components.

**Regarding claim 7**, the modified cable of Vulis discloses superconducting cable line comprising: a superconducting cable set forth in claim 3 (the modified cable of Vulis, as applied to claim 3 above) having a plurality of cable cores each including a superconducting layer (figure 6); but does not disclose a splitter which houses separated portions of the plurality of cable cores such that the separated cable cores are sufficiently distanced from each other, wherein the portions whose critical current values are differentiated from those of the normal portion (i.e., the other portion of the cable cores) are housed in the splitter.

Nassi, in figure 4, discloses a splitter housing three phase superconducting cable cores separated sufficiently distanced from each other, with cold area in a casing (111) in which coolant fluid is maintained a low temperature (column 8, line 54-62).

Dixon, in figure 1-3, discloses a modular high temperature superconducting lead for carrying large currents from a room temperature power source to a superconducting device operating at cryogenic temperatures and further recites that internal part can be replaced if damaged.

Harrmann, in figure 1, discloses transmission line with metallic joint (2) metal tube (5) and further recites a one way valve to evacuate nitrogen gas resulting from evaporation of the liquid nitrogen.

It would have been obvious to a person of ordinary skill in the art to provide the modified superconducting line of Vulis in a splitter at connection where superconducting line is connected with non-superconducting line. Further, as recited by Dixon it would

be advisable to arrange the repairable / replaceable part in the splitter box to be able to repair / replace in case of damage.

Therefore, it would have been obvious to a person ordinary skill in the art at the time of applicant's invention to have the modified cable of Vulis arranged in a splitter with critical current differentiated portion in the splitter from the teachings of Nassi, Dixon and Herrmann, in order to facilitate repair / replace the damaged components.

**Regarding claim 8**, the modified cable of Vulis discloses superconducting cable line comprising: a superconducting cable set forth in claim 4 (the modified cable of Vulis, as applied to claim 4 above) having a plurality of cable cores each including a superconducting layer (figure 6); but does not disclose a splitter which houses separated portions of the plurality of cable cores such that the separated cable cores are sufficiently distanced from each other, wherein the portions whose critical current values are differentiated from those of the normal portion (i.e., the other portion of the cable cores) are housed in the splitter.

Nassi, in figure 4, discloses a splitter housing three phase superconducting cable cores separated sufficiently distanced from each other, with cold area in a casing (111) in which coolant fluid is maintained a low temperature (column 8, line 54-62).

Dixon, in figure 1-3, discloses a modular high temperature superconducting lead for carrying large currents from a room temperature power source to a superconducting device operating at cryogenic temperatures and further recites that internal part can be replaced if damaged.

Herrmann, in figure 1, discloses transmission line with metallic joint (2) metal tube (5) and further recites a one way valve to evacuate nitrogen gas resulting from evaporation of the liquid nitrogen.

It would have been obvious to a person of ordinary skill in the art to provide the modified superconducting line of Vulis in a splitter at connection where superconducting line is connected with non-superconducting line. Further, as recited by Dixon it would be advisable to arrange the repairable / replaceable part in the splitter box to be able to repair / replace in case of damage.

Therefore, it would have been obvious to a person ordinary skill in the art at the time of applicant's invention to have the modified cable of Vulis arranged in a splitter with critical current differentiated portion in the splitter from the teachings of Nassi, Dixon and Herrmann, in order to facilitate repair / replace the damaged components.

**Regarding claim 9-12**, the modified structure of Vulis discloses all the features of the claimed invention including a coolant for cooling the superconducting cable fills the splitter, and a regulating valve for regulating the pressure when the coolant vaporizes is provided for the splitter, as applied to claims 5-8 respectively.

**Regarding claims 13 and 14**, the modified structure of Vulis discloses all the features of the claimed invention as applied to claim 5 and 9 respectively, but does not disclose portions having a smaller critical current value are disposed in the splitter at positions distanced from the assembled portions of the cable cores. However, those

portions will be provided at a location where it will be convenient to repair / replace the damaged parts.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the modified structure of Vulis with the location of a smaller critical current value portion as claimed in claims 13 and 14, to facilitate convenient repair / replace in case of damage.

**Regarding claims 15-17**, the modified structure of Vulis discloses all the features of the claimed invention as applied to claims 5, 9 and 13 respectively but does not disclose holding fixtures for holding the cable cores in the splitter are movable in the splitter in accordance with the expansion and contraction of the cable cores and hold the cable cores in a state in which the cable cores are separated from each other, as claimed in claim 15-17. Nassi, in figure 2, disclose fixture (support 108) for supporting individual core, but does not explicitly disclose them movable. However, as further recited by Nassi, there will be a change in temperature during short circuit due to increased current value. Also, the two ends of the splitter box will be at different temperature [normal (hot) and cold]. As a result the expansion / contraction of the cable will need flexibility to avoid damage. A person of ordinary skill in the art would provide the sliding / flexible / movable holding fixture to avoid the damage due to temperature change.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the modified structure of Vulis with movable holding fixture, in order to avoid damage due to temperature change.

***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hara (US Patent No. 5,617,280), in figure 1, discloses a fault current limiter in a box (cubicle)

Metra (US Patent No. 6,049,036), in figure 3 and 4, discloses terminal for connecting a multiphase superconducting cable.

Satarou (European Patent Application No. EP 0 808 009 A2) discloses a superconducting system with the superconductor connected to a power supply at room temperature.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (571) 272 1933. The examiner can normally be reached on M-F (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272 1957. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ishwar (I. B.) Patel
Patent Examiner
Art Unit: 2841
January 24, 2006